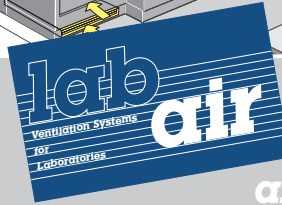
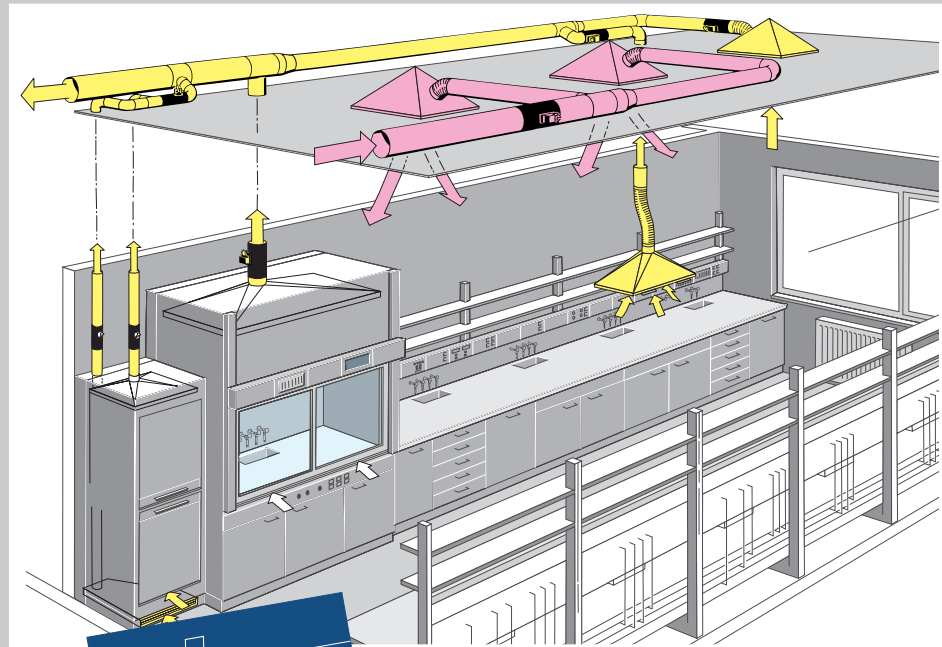


LTG labair® - System



**Ventilation Systems
for Laboratories
and Fume Cupboards**

LTG's expertise is based on more than 75 years of experience of ventilation technology,

ranging from room ventilation in commercial and industrial premises to complex process air technology.

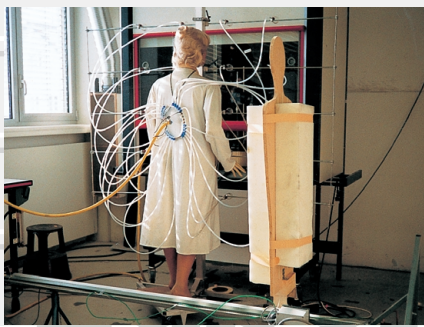
LTG's modern research and development centre offers the ideal facility for the creation of innovative air technology solutions.

The main demands on ventilation systems for laboratories and fume extractors include:

- Extraction of pollutants and reduction of thermal loads.
- Safety systems for the protection of personnel and the environment in accordance with DIN 12924 T1:
 - Monitoring of functions
 - Initiation of visual and audio alarms in the event of malfunctions
- Minimum air circulation rates, limitation of noise development, avoidance of drafts in accordance with DIN 1946 T7
- Application-related exhaust air extraction and application-matched introduction of fresh air
- Sash closure when not in use in accordance with the guidelines for laboratories (published by the Employer's Liability Insurance Companies).



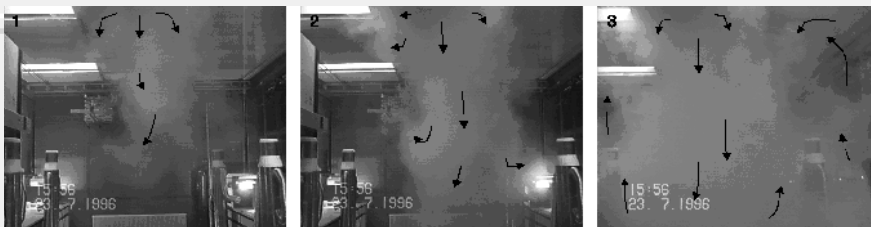
LTG Research and development centre



Measurement of pollutant discharge within the framework of the RELAB project

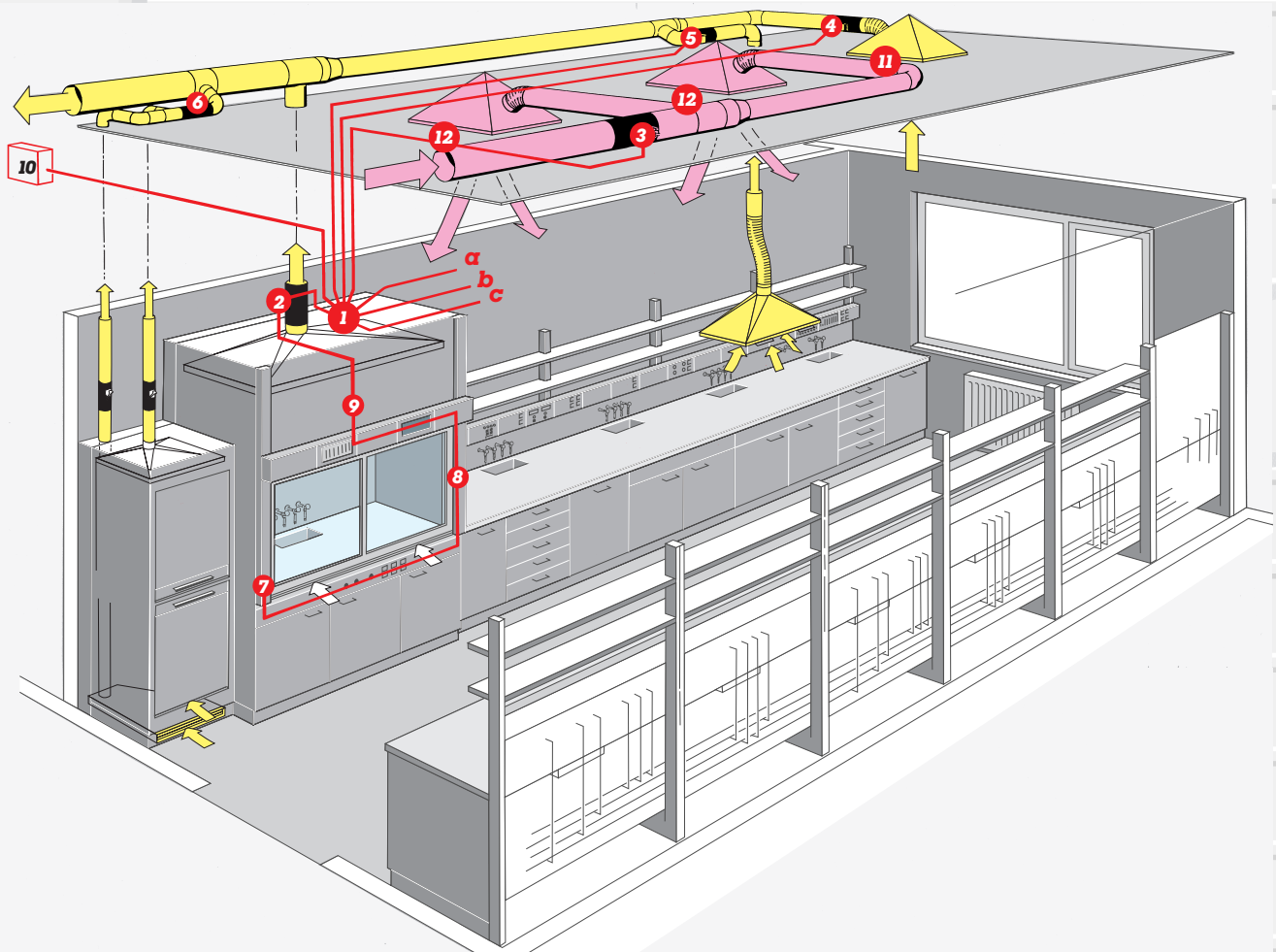
LTG is also an industrial partner for the RELAB research project (energy savings in laboratories by reduction of air flows) of the University of Stuttgart.

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Air distribution and room ventilation flow patterns with LTG slot discharge system LDB

The LTG labair[®]-System meets the Maximum Demands for Laboratory Room and Fume Cupboard Ventilation Systems



- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ① Group controller LAG ② Volume flow controller LAR for fume cupboard exhaust air ③ Volume flow controller VRE for room fresh air ④ Volume flow controller VRE for room exhaust air ⑤ Volume flow controller VRE for switchable consumers | <ul style="list-style-type: none"> ⑥ Mechanical self-actuating, constant volume controller VRV for floor-level extraction and solvent cupboards ⑦ Sash position sensor LAP ⑧ Function display LAF with control element LAB ⑨ Automatic closing system LAS | <ul style="list-style-type: none"> ⑩ BMS/DDC external (Building Control Technology/Direct Digital Control) ⑪ Exhaust air inlet DLA ⑫ Exhaust air outlet DLA a. Room temperature input b. Room pressure input c. Input for monitoring of minimum air change rate |
|---|---|---|

The labair[®]-System

Range, Function & Quality

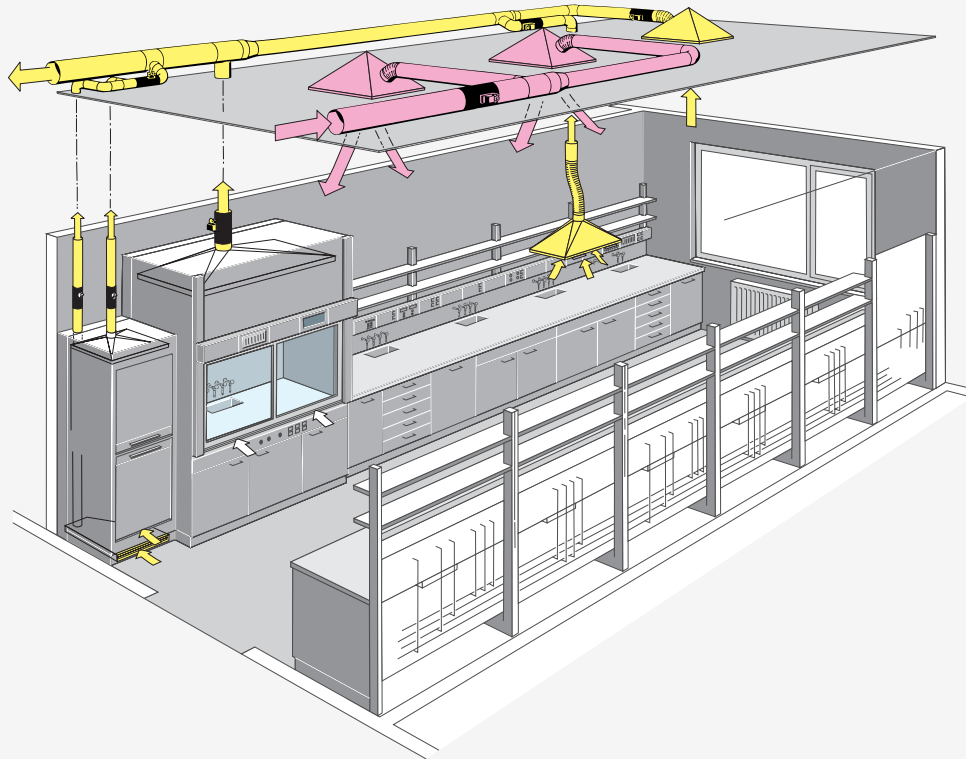
- The LTG offers system components for:
 - Wipe-up/Production areas
 - Laboratory rooms
 - Complete laboratory complexes
- Precise maintenance of pressure relationships is achieved by the labair[®] system by balancing the volume flows ($\sum V_{in} \leq \sum V_{out}$)
- Controller parameters are factory programmed.
- All system components which come into contact with exhaust air are made of flame-resistant polypropylenes (PPs), galvanised steel with additional epoxide resin-powder coating or stainless steel.
- If required, LTG can undertake responsibility for commissioning.

Advantage of the labair[®]-System

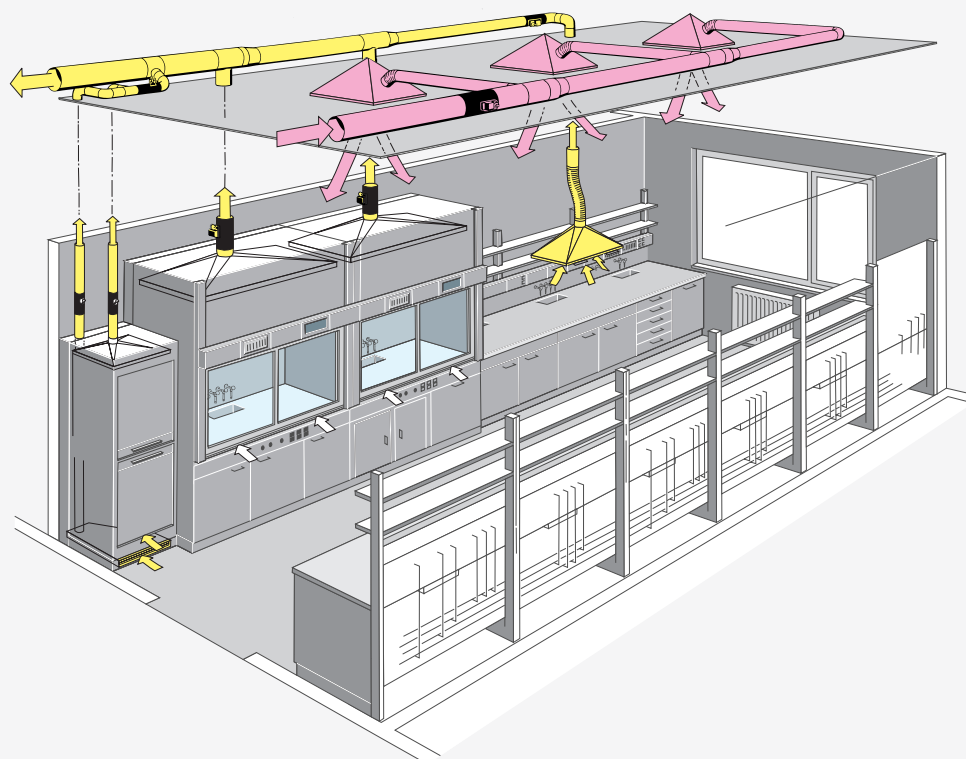
- **Reduced design/planning costs**
The labair[®] system is supplied complete from a single source. As a result, the number of interfaces is reduced which, in turn, leads to reduced planning and installation costs.
- **Maximum functional reliability**
The labair[®] system comprises practice-proven “matched components”. Operationally-reliable sensor value transmission via current signals.
- **Saving of both investment and operating costs**
Employment of labair[®] allows considerable reduction of the ventilation plant dimensions. The exhaust air quantities of the individual fume cupboards are regulated in accordance with actual requirements, ensuring maximum diversity usage.
- **Universal applicability**
The labair[®] system is matched to the leading laboratory equipment systems available on the market.
- The labair[®] system can be integrated into the building control system technology.

LTG Fume Extractor Control System

- In compliance with DIN 12924 T1 and DIN 1946 T7 (function display and actual value feedback signal).
- Requirement-related air flow rates by constant, staged or infinitely variable regulation of the exhaust air volume flow.
- Regulation of volume flow as a function of sash position.
- Self-monitoring regulation system by cyclic checking of the sensors and comparison of two independent effective pressure measurements.
- Effective pressure measurement via measuring flow restrictor and blade for indirect determination of the volume flow, High-accuracy measurement over the complete range is possible with regulation ratios of 1:15.
- Long-term stability by daily, pressure sensor zero-point calibration.
- 230 VAC power supply, thus no requirement for low voltage circuits.
- Setting time for start up is 2 seconds for 90° blade angle change
- Automatic sash closing system with electronic movement sensor, option, offering considerably lower diversity factor. The ventilation plant dimensions can be reduced considerably which reduces investment and operating costs.



Laboratory with one fume cupboard and room air extraction



Laboratory with two fume cupboards and no room air extraction

The Components

Group Controller LAG

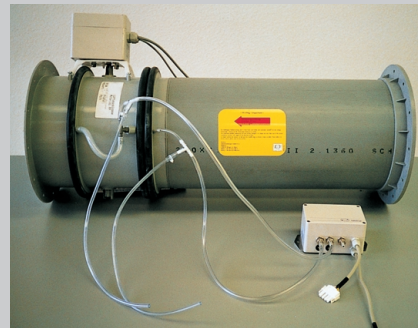
The group controller LAG is the central interface for all components and connection to the BMS system. The controller acquires individual exhaust air quantities & calculates the totals for adjustments to be made by the BMS or the fresh air controller. Protective pressures can be established in the room by freely selectable differentials used for balancing the exhaust and fresh air flow rates. Digital alarm and controller status signals are transmitted to the BMS and command signals are returned. Parameters such as room pressure, room temperature or minimum air exchange can be employed as superior regulators.

Volume Flow Controller LAR for Fume Cupboard Exhaust Air

The LAR controller regulates the fume cupboard single-stage, or variable exhaust air volume flow as a function of the position of the sash. When the sash position is changed, the controller sets theoretically determined reset signal instantly. Pollutant escape is thus prevented in accordance with DIN 12924. The resultant specified/actual deviations are then balanced. An accuracy of $\pm 5\%$ of the specified value is achieved after only 5 seconds. Regulation is self-optimising and thus matches itself to the plant characteristics. Volume flows of permanently exhausted units are entered as constant parameter. All controllers in a room operate together via a bus system.

PPs Volume Flow Controller LAV for Fume Cupboard Exhaust Air

Effective pressure signals are acquired, via a measuring restrictor and the blade, at three positions. As a result of this effective pressure measuring method a control relationship if 1:15 is possible. The controller blade can be located immediately after equipment elements. The drive has a setting time of max 2 seconds for a blade angle change of 90° .



Volume flow controller LAV

Pressure Measuring System

The pressure measuring system LAD consists of a static pressure transmitter with an operationally reliable current output. An optional version with regular, automatic self-monitoring and zero-point calibration via integrated solenoid valves is also available.

Sash Position Sensor LAP

The sash position sensor LAP determines the position of the sash. Dependent on the fume cupboard version, various sensor solutions are adapted: usually a continuous push-pull cable sensor or rotary potentiometer driven by a toothed belt. In applications employing the automatic closing system, the position sensor is already integrated. If transverse slides are employed, the positions of these are acquired via position switches.

Functional Display LAF with Control Element LAB

This sub-assembly comprises a processor unit with mains element and emergency power accumulator. The differential pressure between two defined positions is measured by a pressure sensor. The specified volume flow is calculated and compared against safety-technical limit values. If the limit values are exceeded, an audio visual warning is initiated. Display and control units can be accommodated in a separate housing, in an electrical channel or direct on the extractor. The effective operational mode is indicated by LED. Control command input is via keys. It is thus possible to electronically block individual commands internally for the user.

Automatic Closing System LAS

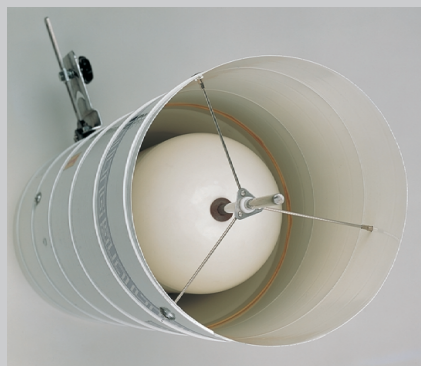
The automatic closing system LAS closes the fume cupboard sash after a predetermined delay period when no person is in front of the cupboard. If the sash encounters an obstacle, the drive is switched off by means of a power limiter. Dependent on the make of the fume cupboard, the sash opening may be optionally monitored by means of a light barrier. As with the sash closed fume extraction can be accomplished with a considerably reduced volume flow, this unit contributes to extensive cost reductions.

Mechanical Automatic Volume Flow Controller VRV

The volume flow controller VRV regulates, without supplementary power source, an adjustable, constant flow quantity and is used for continuously extracted applications such as solvent cupboards and floor-level extraction. The preset volume flow is programmed, as a constant parameter, into the volume flow controller LAR. It is made of galvanised steel with an additional epoxide-resin power coating. An optional sound attenuation jacket is available.



Volume flow controller VRV



Volume flow controller VRV
Internal view with controller body

Volume Flow Controller VRE for Room Fresh and Exhaust Air

The volume flow controller VRE is equipped with an electronic regulator. Pressure measurement is made via a restrictor and the calculated volume flow is passed to the LAR controller for balancing of the volume flows in the laboratory. The regulating ratio is 1:7. Version, galvanised steel.

Options:

- With sound attenuation jacket
- With blade seal to meet DIN 1946 T4
- With high-speed motor
- With silencer



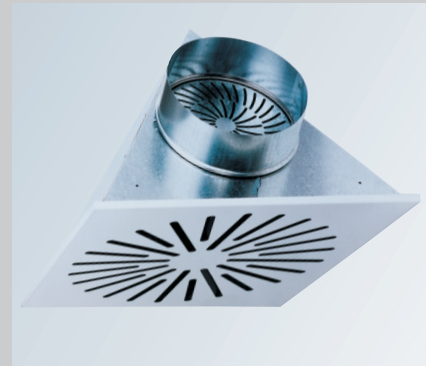
Volume flow controller VRE

Volume Flow Controller VRE for Switchable Consumers

Source extractors, selected by the laboratory users, can energise VRE regulators. The recommended construction is PP's polymer or V4A stainless steel. The operational mode OFF = blade closed, or ON = preset constant volume flow is selected via a switch located on the extractor unit. The actual status is passed to the group controller and is thus included in the balancing of the air quantities.

Ceiling Air Outlet DLA 7

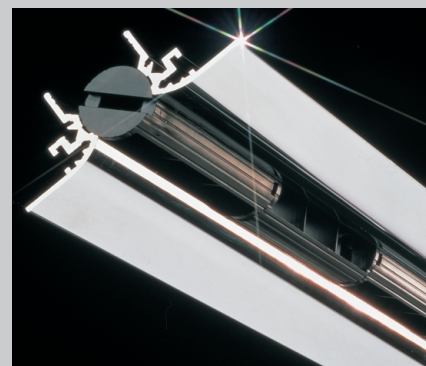
The DLA ceiling air diffuser is a highly inductive diffuser which can be either integrated into the ceiling tiles or suspended freely. The diffuser is preset ex-works, the air flow can be easily set for either tangential or vertical discharge. This is simply accomplished by central setting of the rotary plate in the diffuser.



Ceiling diffuser DLA 7. Optionally with pyramid-type air distribution box model P

Ceiling Air Outlet LDB

With the slot diffuser LDB the blow-out direction can be freely selected. The slot-type nozzles are arranged between aluminium rails and can be adjusted individually thus facilitating a wide range of air flow patterns. Optimum room conditions can also be established, even after subsequent changes to the room requirements, by simply repositioning the slot-type nozzles.



Ceiling diffuser LDB